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REVIEW OF LIVING CAENOLESTIDS WITH
DESCRIPTION OF A NEW GENUS
FROM CHILE

BY

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REPORTS ON RESULTS OF
THE CAPTAIN MARSHALL FIELD EXPEDITIONS



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REVIEW OF LIVING CAENOLESTIDS WITH DESCRIPTION OF A NEW GENUS FROM CHILE

BY WILFRED H. OSGOOD

Among many interesting mammals obtained by the Captain Marshall Field Expedition to Chile in 1923, the most important novelty is a small marsupial representing an undescribed genus related to *Caenolestes* and *Orolestes*. It was found in the forests of the island of Chiloe nearly two thousand miles from the known habitat of its nearest relatives. Thus it not only provides valuable material for further study of an archaic group of mammals, but constitutes an important addition to the fauna of Chile.

In 1911, when an expedition from Field Museum found *Caenolestes obscurus* living in the mountains of Venezuela, the interesting group to which it belongs was represented in the museums of the world by only half a dozen imperfect native-collected specimens. The fresh material obtained at that time, including complete skeletons and soft parts in preservative for dissection, was considered so important it was made the subject of a special monographic study (antea, pp. 1-162). Continued work by trained American collectors in South American fields has resulted in an unexpectedly large increase in knowledge of the group. At the present time, including the form described below, there are recorded not less than seven species of living caenolestids belonging to three well-marked genera.

The original example of *Caenolestes fuliginosus* from Ecuador was described by Tomes under the generic name *Hyracodon* in 1863 and no further specimens appeared for more than thirty years, when the British Museum received four collected in 1895 by natives employed by Mr. G. D. Child, on the La Selva Hacienda, near Bogota, Colombia. One of these was acquired by the American Museum of Natural History and three remained in the British Museum, one being the type of the new species *Caenolestes obscurus*. Another long period ensued until 1911, when the present writer secured a series of eleven specimens in Venezuela and Colombia not far from the Bogota region. Later, in the same year, Mr. S. N. Rhoads collected for the Academy of Natural Sciences of Philadelphia two specimens at Hacienda Garzon, Mount

Pichincha, Ecuador, in the region from which came the original type of *C. fuliginosus*. Two additional specimens were collected at Gualea, Ecuador, by Mr. Walter Goodfellow and presented to the British Museum in 1914. Then, in 1915, Mr. Edmund Heller found caenolestids in abundance in a new region about the upper waters of the Urubamba River in Peru. He secured a large series numbering thirty or more specimens upon which was founded the new genus and species *Orolestes inca*. This series is in the U. S. National Museum at Washington. In 1920, Mr. H. E. Anthony, of the American Museum of Natural History, discovered a well-marked new species, *Caenolestes caniventer*, in the province of Oro, Ecuador, and in 1922 the same author described a third species from Ecuador, *Caenolestes tatei*, collected by Mr. G. H. H. Tate in the province of Azuay. Series of both these species, as well as additional specimens of *C. fuliginosus*, have been obtained recently in Ecuador by Mr. Anthony and Mr. Tate. Meanwhile, Dr. Einar Lönnberg, in 1921, recorded six specimens from various localities in Ecuador obtained through Consul L. Söderström. Finally, as stated above, a third genus has now been found in Chile.

In connection with the description of this genus, it has seemed desirable to present the brief statement of the systematic status of the whole group which follows. Specimens of forms not in the Field Museum, loaned by the American Museum of Natural History and the U. S. National Museum, are gratefully acknowledged.

Caenolestes Thomas.

(Plate XXIII, figs. 1, 1a, 1b.)

Caenolestes Thomas, Ann. & Mag. Nat. Hist., (6), 16, pp. 367-368, Nov. 1895—type, *Hyracodon fuliginosus* Tomes 1863, from Ecuador.

Characters. Size small; form soricine; tail longer than head and body, non-prehensile; feet pentadactyl eleutherodactyl; marsupium absent; mammae $\frac{3}{4}$ =4, inguinal; habits cursorial and insectivorous; color uniform. Skull with elongate facial region; braincase large, deep and thin-walled, without external ridges or crests; interorbital and lacrymal regions swollen; nasals long and slender, abruptly expanded posteriorly; a marked vacuity between the nasals, frontals and maxillaries; zygomata slender, their roots rising at the plane of the third molar; palate highly fenestrate; tympanic annular; a carotid canal between the petrous periotic and the basioccipital. Teeth numerous and highly differentiated; anterior pair of incisors terminal and of the "diprotodont" type; second and third pairs of upper incisors in con-

tact with each other, lateral in position and laterally compressed in form, their functional edges entire, forming cutting blades slightly inclined forward; last pair of incisors similar to others but smaller and separated from them by a slight space; canine well-developed, falcate, single-rooted; anterior molariform teeth quadrate bunolophodont with a basal external cingulum; a small metaconule usually present. Tooth formula: I. $\frac{4}{1}$; C. $\frac{1}{1}$; Pm. $\frac{3}{3}$; M. $\frac{4}{4}$;=46.

Remarks. Four species of the genus *Caenolestes* have had nominal recognition, three from Ecuador and one from Colombia. All of these are obviously very closely related and the material has been so limited that characterizations of them have been rather unsatisfactory. *C. fuliginosus*, *C. obscurus* and *C. tatei* are so much alike in color and all general characters that further study with more material may prove them to be no more than subspecifically separable. Comparison has been made of a small series of *C. obscurus* from Paramo de Tama, Colombia-Venezuela boundary with a half dozen specimens from Ecuador, representing *fuliginosus*, *caniventer* and *tatei*. Collectively, the specimens of *obscurus* may be distinguished from those from Ecuador by the slightly more slender facial part of the skull and by the unnotched cutting edges of the second and third incisors. In one specimen of *obscurus*, the second incisor shows a faint indication of a notch, but in all others it is entire, whereas in all Ecuadorean specimens examined, this tooth is definitely notched and in some cases the third incisor is similarly notched. This character, to which attention has been called by Mr. Anthony, is accompanied by a somewhat greater forward rotation of the tooth and by a closer contact of the second incisor with the first. The supposed large size and the closing of the anteorbital vacuities mentioned by Thomas and Lönnberg as characters of *obscurus* are not appreciable in the material at hand. In the largest male of *obscurus* from Paramo de Tama, having a skull length of 32.5 mm., the combined length of the three anterior molars is only 5 mm. In the largest male from Ecuador (type of *caniventer*), with a skull length of 33.5, the three principal molars measure 5.4. In all specimens of *obscurus* from Paramo de Tama and, likewise, in all Ecuadorean skulls examined, the anteorbital vacuities are open. The type of *C. tatei* is a very small female and rather dark in color, but there is much variation in these respects among other Ecuadorean specimens. *C. caniventer* seems to be well characterized by average large size and by its more sooty, less brownish, coloration on the upperparts and its decidedly pale grayish underparts. A peculiar circumstance is the occurrence of both *C. tatei* and *C. caniventer* at the same locality (Mol-

leturo). It is greatly to be hoped that Mr. Anthony, with his field experience and the considerable series of *Caenolestes* which he is accumulating from Ecuador, will be able to clear up all uncertain points in connection with the variation, distribution, and pelage changes of these forms.*

Orolestes Thomas.

(Plate XXIII, figs. 2, 2a, 2b.)

Orolestes Thomas, Smiths. Misc. Coll., 68, No. 4, p. 3, Apr. 10, 1917; Proc. U. S. Nat. Mus., 58, pp. 244-247, pl. 14, fig. 5, 1920—type, *Orolestes inca* Thomas, from Torontoy, Peru.

Characters. External form, size and coloration much as in *Caenolestes*; cranial characters also generally similar to those of *Caenolestes*; jugal broader and more flattened anteriorly; external boundaries of infraorbital foramina slightly farther back. Antemolar teeth showing various differences from those of *Caenolestes*; fourth upper incisor sharply pointed and slightly retrorse, separated from the third and from the canine by a space equal to or greater than its alveolar length; canine double-rooted and premolariform, only slightly higher than incisors; first premolar a small blunt peg scarcely projecting above the gums, one third to one fourth as large as in *Caenolestes*; molariform teeth practically as in *Caenolestes*; fourth upper molar very small, scarcely more than half as large as in *Caenolestes*; lower canine smaller than incisors; fourth lower molar reduced in size.

Remarks. *Orolestes* is characterized principally by its low double-rooted canine and its minute first premolar. The food habits of *Orolestes* and *Caenolestes* are presumably the same and it is difficult to find teleological grounds for a pronounced difference in their canines.

Only one species (*O. inca*) of *Orolestes* has thus far been discovered. The original series from the upper Urubamba region of Peru has not been duplicated. Mr. Heller, who collected this series, has recently worked again in Peru somewhat north of the Urubamba valley in the upper Marañon and Huallaga region, but failed to obtain any caenolestids.

One of the specimens of *Orolestes* examined (No. 194948 U. S. N. M.) shows an interesting abnormality in the fusion of the lower canine and the first premolar, forming an imperfectly three-rooted tooth

*Since this was written a fourth species from Ecuador has been described by Mr. Anthony (*Caenolestes convelatus* Anthony, Amer. Mus. Novit., No. 120, pp. 1-3, June 21, 1924). This is characterized as "Most like *caniventer* in external appearance but skull lacking facial vacuities and dentition heavier."

with a tendency to become two-rooted through the coalescence of the root of the canine with the anterior root of the premolar.

Rhyncholestes genus novum.

(Plate XXIII, figs. 3, 3a, 3b, 3c.)

Type, *Rhyncholestes raphanurus* sp. nov.

Characters. External appearance much as in *Caenolestes* and *Orolestes*, but tail shortened and (at least periodically in the male) thickened at the base, making it elongate radicleform with a basal diameter of 7 mm. or more. Mammae five, two inguinal on each side and one midventral slightly in advance of them. Skull very narrow and elongate, especially the facial part, the ratio of the zygomatic breadth to the total skull-length being only 41.9* or about equal to that in the peramelids. Antemolar teeth widely spaced; second, third and fourth upper incisors with a broad anterior blade and a blunt, slightly curved, posterior cusp, the two parts separated by a deep cleft; upper canines single-rooted, strictly caniniform in the male, but somewhat premolari-form in the female, in which there is a faint anterior cusp and a marked posterior one; principal molariform teeth much as in *Caenolestes* and *Orolestes*, but (at least in the two known specimens) without any apparent development of metaconules; fourth molar minute, even more reduced than in *Orolestes*. Posterior palatine vacuities without any median bony division except for slightly pointed prolongations of the maxillary and the palatine, thus leaving the deeply-channeled ventral surface of the vomer exposed for a considerable part of its length. Anteorbital vacuities much as in *Caenolestes*; infraorbital foramen opening over middle of first molar, divided by a bony bar forming a double foramen, the lower and larger division of which opens forward as usual and the upper and smaller, elliptical in shape, opens laterally in the exposed wall of the maxillary. Zygomata relatively broad and flattened throughout and channeled anteriorly on the exterior surface; a downwardly directed knoblike process at the junction of the jugal and the maxillary.

Skeletal characters mostly as in *Caenolestes*. Humerus relatively shorter, the ratio of its length to the ulna 67 as against 79 in *Caenolestes*; deltoid ridge occupying fully half the length of the humerus; outer epicondylar or supinator ridge not meeting the shaft of the humerus gradually but abruptly with a tendency to the development of a hooked process; metapodials relatively short; first and second caudal

*This ratio in *Caenolestes* is 47.7; in *Perameles nasuta* it is 39.7 and in *P. bougainvillei* 43.2; in other marsupials it is much greater (see antea, p. 99).

vertebrae with spinous processes; total number of caudals reduced to 22 (27 in *Caenolestes*).

***Rhyncholestes raphanurus* sp. nov.**

Type from forests at mouth of Rio Inio, south end of Chiloe Island, Chile. S. lat. $43^{\circ} 20'$. No. 22422 Field Museum of Natural History—skin and skeleton. Adult female. Collected Jan. 12, 1923 by Wilfred H. Osgood. Original No. 5500.

Characters. Color and character of pelage practically as in *Caenolestes fuliginosus* and *C. obscurus*, perhaps slightly darker; rich dark brown above and below without markings of any kind; tail nearly black all around, darker and less brownish than in any of the northern forms examined. In the type, which is a female, the tail is self-colored, but in the male, the skin of which could not be preserved, it was noted in the field that the tail was bluish black except on the terminal third which was mottled black and white above and below and with the tip entirely white. General characters as given in the generic diagnosis.

Measurements. Adult male and female, respectively: Total length 204, 175; tail vertebrae 78, 65; hind foot 21, 19.5; ear from notch 11, 11; diameter of tail at base 7, 5. Skulls: Greatest length 34, 30.3; basal length 33.3, 29.6; zygomatic breadth 14.7, 12.5; mastoid breadth 11.1, 10.2; length of nasals 18, 15.8; greatest breadth of nasals 3, 2; least interorbital breadth 6.9, 7; length of palate from gnathion 20.3, 17.5; anterior palatal foramina 9.7, 7.3; palatal vacuities 6, 5.8; front of upper canine to back of last molar 13.9, 11.9; combined length of four upper molars 5.4, 5.2; combined length of three lateral incisors 3.9, 3.5; length of bone of mandible from condyle 20, 18; exposed length of median lower incisor 6.8, 6.1.

Remarks. This genus is well characterized in numerous ways. In the dentition, the most striking peculiarity is seen in the unequally bifid lateral upper incisors, the interpretation of which has many interesting possibilities. The canines also are of especial interest since they provide at least a hypothetical intermediate stage between those of *Orolestes* and *Caenolestes*. In view of the diversity in the dentition of the three genera of caenolestids now living, it is evident that considerable changes may have taken place in a relatively short time, and it is perhaps idle to speculate on the history of particular teeth over long geological periods. However, if the bifid lateral incisors of *Rhyncholestes* and the premolariform canines of *Orolestes* (and *Rhyncholestes*) be regarded as primitive, they fall into a long list of other primitive characters possessed by these forms. Taking them together, incisors

and canines, the presumption that they are primitive is very strong. The incisors have no parallel among modern marsupials and if they were present in any of the Miocene caenolestids, it is not suggested by the scanty material yet available; but they could be derived easily from some types of early insectivores or from the triconodont teeth so common among Mesozoic mammals. The simple three-cusped type of tooth now seen in the anterior premolars of caenolestids could produce the lateral upper incisor of *Rhyncholestes* by reflexing the principal cusp, bringing the anterior face of this cusp toward the horizontal and approximating the apices of the central and the posterior cusps thus deepening the cleft between them and giving it a less regular form, meanwhile elevating the front of the tooth and reducing the anterior cusp to a mere angle—in other words, by rotating the whole tooth backwards. Continuing this process and eliminating the posterior cusp might produce the simple hatchet-shaped blade seen in the upper lateral incisors of *Caenolestes obscurus*. The slight sulcus near the posterior angle of these teeth, noted by Anthony in certain Ecuadorean examples of *Caenolestes*, may be a vestige of the process, but this is uncertain. The roots of the lateral incisors are broad and heavy and also suggest derivation from a two-rooted premolariform antecedent. Examination of the teeth by transmitted light shows a longitudinal deficiency of dentine above the center of the root such as might be expected after the coalescence of two roots.

The condition of the canines in *Rhyncholestes* leaves little room for doubt that the two-rooted premolariform canine seen in *Orolestes* is the forerunner of the single-rooted scalpriform canine of *Caenolestes*. In *Rhyncholestes* both types are represented, one in the female, the more primitive, and the other in the male, more specialized. The tooth in the female has the two roots partly coalescent and its apex is somewhat elevated, but it retains a well-defined posterior cusp and a trace of an anterior one. In the male it has full single-rooted caniniform development. Viewing this tooth in the female in connection with the two premolars behind it and the three incisors in front of it, the essential similarity of the whole series is striking, and the belief that all have been derived from the same type of tooth is scarcely to be avoided. Two-rooted premolariform canines, it is interesting to note, are found in other marsupials only in *Choeropus*, one of the peramelids.

An unexpected external character of *Rhyncholestes* is the possession of five mammae instead of four. The fifth is in median position somewhat in advance of the others, which are paired as in *Caenolestes*. This constitutes a similarity to the didelphids, the only other group

previously known to have mammae in odd numbers, but doubtless it is not especially significant of relationship.

The discovery of this new genus of caenolestids at sea level, in the forests of southern Chile, enormously extends the range of the group and renders it probable that further forms will be found in the great areas intervening between the relatively few spots at which specimens have been taken. Only two specimens of *Rhyncholestes* were obtained, fortunately male and female, both fully adult. The locality was in heavy temperate forests near the mouth of the Rio Inio at the extreme southern end of Chiloe Island. Here it was only after much trapping that the first specimen, the female, was taken. The vicinity was thereupon carefully re-examined and additional traps placed in all promising situations with the result that at the end of a week's time, the male was secured. An enforced absence had made it impossible to visit the traps for several days, and the male specimen was found in somewhat decomposed condition so that, although color notes and measurements could be taken, the skin could not be saved.

During some five weeks of constant trapping on Chiloe Island no other specimens of *Rhyncholestes* were taken, so it is evidently rare and difficult to obtain. Doubtless it is not confined to Chiloe Island, but will be found also on the forested mainland of southern Chile. Various localities in this region were visited, however, and although conditions seemed favorable, all efforts to secure additional specimens were unsuccessful.

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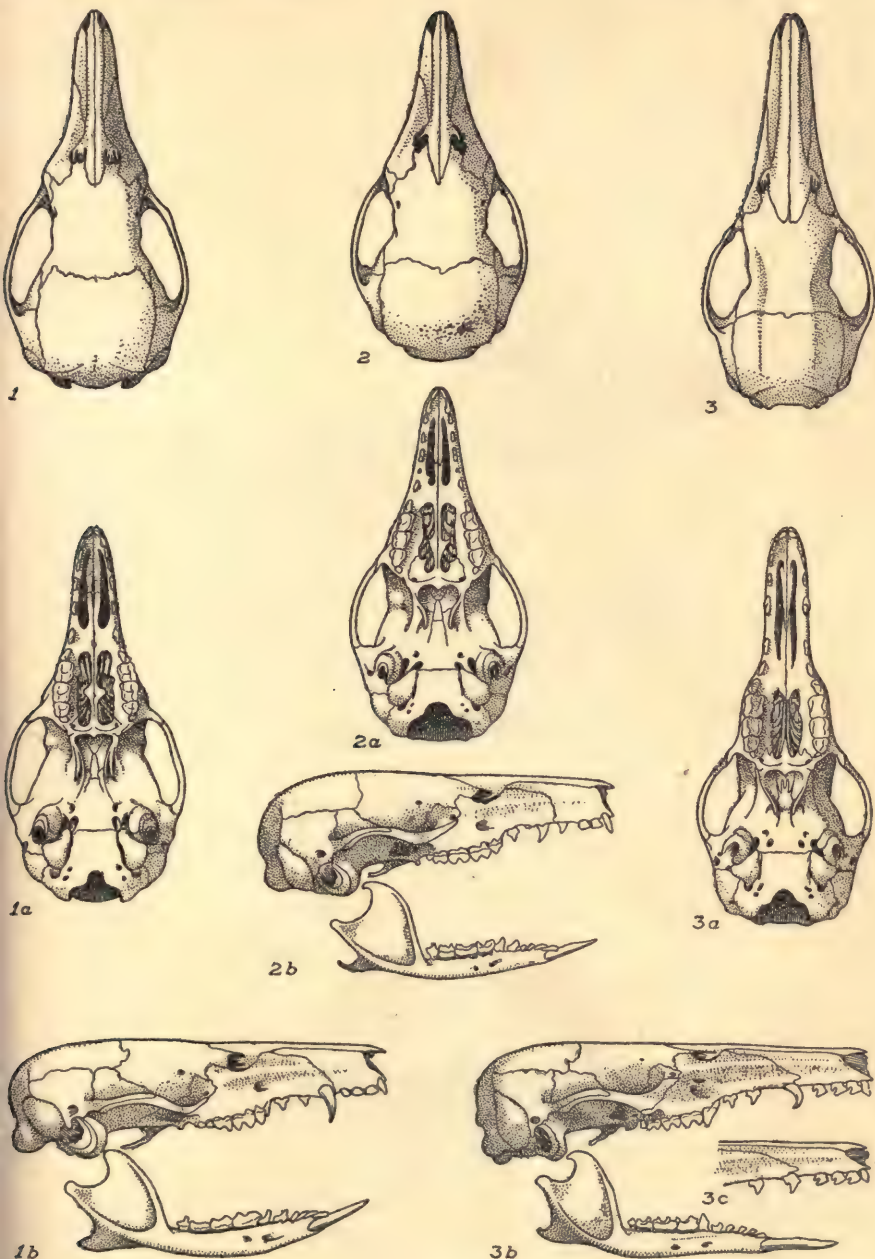
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Carl F. Gronemann, del.

1, 1A, 1B. *Caenolestes obscurus*.
F. M. N. H. No. 18602, Male.

3, 3A, 3B, 3C. *Rhyncholestes raphanurus*.
F. M. N. H. No. 22423, Male; No. 22422, 3c Female.

2, 2A, 2B. *Orolestes inca*.
U. S. N. M. No. 194428, Male.
(X 1½.)

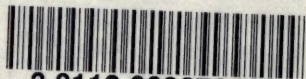
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